Measure Works

No. A-246
Instructional Computing Courseware
for Apple® II Series Computers

for the love of learning

mecc

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No. A-246
Instructional Computing Courseware
for Apple® II Series Computers

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MECC

This manual is compatible

with

the ***Measure Works*** disk

Version 1.x

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Measure works [computer file]. — Version 1.0.

1 computer disk : col.; 5 1/4 in. + 1 manual.
System requirements: Apple II series; 128K; ProDOS; BASIC; 1 disk drive; monochrome or color monitor; Apple-compatible printer optional.
Title from title screen.
Edition statement from disk label.
Copy-protected.
Audience: Children (grades 1-4).
Issued also on 3 1/2 in. computer disk.
Summary: A set of five programs that provide students with opportunities to practice measuring the height, width, and length of objects; determine the appropriate unit (weight, linear, or liquid); and estimate linear size using non-standard units of measurement.
"A-246"— Disk label.
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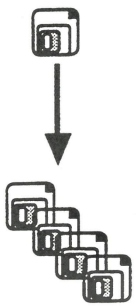

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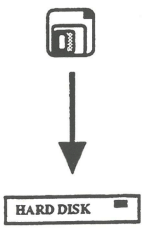

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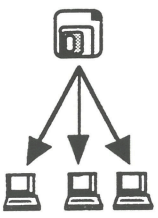

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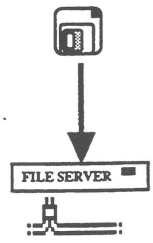

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	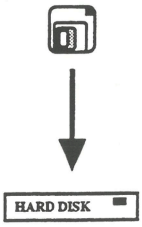	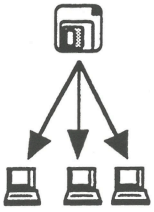	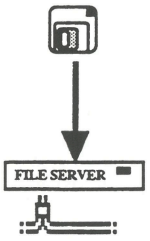
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		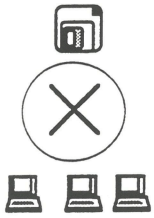	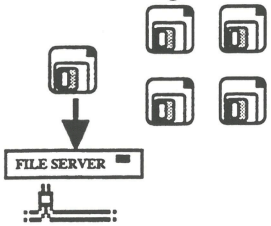
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INTRODUCTION

Measure Works is a set of five programs that provide students with opportunities to practice measuring the height, width, and length of objects; determine the appropriate unit (weight, linear, or liquid); and estimate linear size using non-standard units of measurement. All of the programs can be used in English, metric, or a mixture of problems in each. The level of difficulty for the problems is easily controlled through the Teacher Options. These options enable you to modify the presentation of the material to meet the needs of your students; see pages 2-7 for information on how to access and use each of the Teacher Options.

This manual also contains textbook correlation charts (pages 23-25) that directly connect the instructional objectives from popular elementary textbooks to specific programs in ***Measure Works***. Used with the Teacher Options, these charts enable you to alter the content of the programs to match the instructional sequence in your mathematics textbook.

How Many Units? provides students with ten multiple-choice problems that give practice at estimating the height or width of an object in non-standard units, recognizing measurement units on a ruler, aligning rulers to the baseline of an object, and reading rulers and specifying a measurement for that object.

Shape Builder allows students to experiment and build various shapes that have the same size area.

Fence the Animals challenges students to create shapes with given perimeters.

Ball Drop gives students practice at matching an object name with an appropriate unit that can be used to measure its linear size, liquid capacity, or weight.

Putting Around enables students to have fun playing a round of golf and apply linear measurement skills as they judge the force of their putts.

Students can leave a program by pressing the Escape (Esc) Key twice whenever the program is waiting for a response. The sound can also be turned on or off during a program by typing Control-S when the computer is waiting for a response (press S while holding down the Control Key).

Measure Works is designed for Grades 1-4. Use the Teacher Options to set the content to fit the specific needs of your classes. For classes that may already be familiar with these units of measurement—particularly fourth grade—***Measure Works*** may serve as a good review.

To use ***Measure Works***, you will need an Apple II series computer with 128K of memory and one disk drive. A color monitor is recommended but not required.

TEACHER OPTIONS

Accessing Teacher Options

Several Teacher Options can be used to modify the programs to meet the specific needs of your students. You can access the Teacher Options from the main menu (Figure 1) by typing Control-A (press A while holding down the Control Key). The Teacher Options menu will appear (Figure 2). Use the Up and Down Arrow Keys to move among the options. As each option is highlighted, both the available and currently selected settings are displayed. To modify the settings, simply press the Return Key while the appropriate option is highlighted.

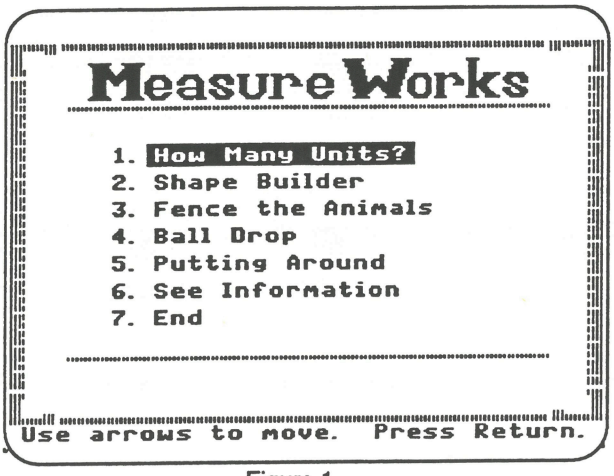


Figure 1

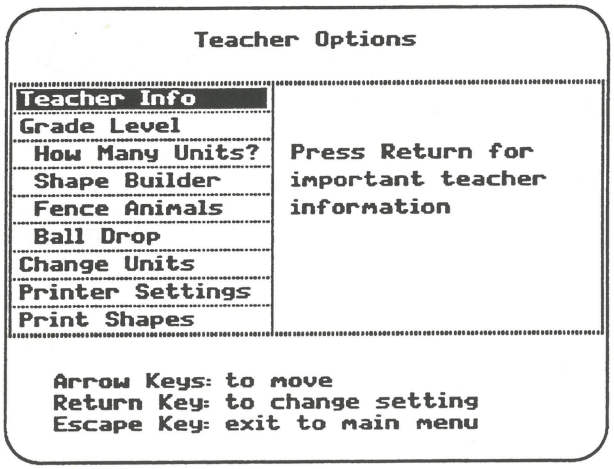


Figure 2

Option 1: Teacher Information

This screen explains some of the limitations we have encountered in displaying rulers on screen. In **How Many Units?** the rulers are drawn proportional to the objects they are shown with and provide correct measurement next to the corresponding object. Measurements made in one system (English) cannot be converted to the other system (metric) and be guaranteed to provide a correct answer to the program.

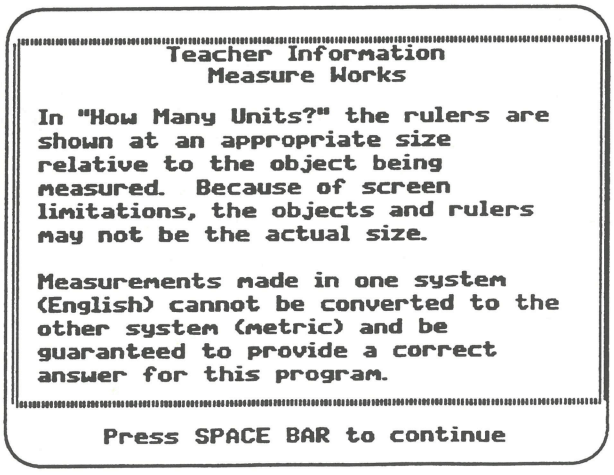

Teacher Information
Measure Works
In "How Many Units?" the rulers are shown at an appropriate size relative to the object being measured. Because of screen limitations, the objects and rulers may not be the actual size.
Measurements made in one system (English) cannot be converted to the other system (metric) and be guaranteed to provide a correct answer for this program.
Press SPACE BAR to continue

Figure 3

Option 2: Grade Level

Grade Level enables you to alter the approximate grade level of the content presented to your students. Designating a grade level automatically adjusts the types of rulers, linear units to present, level to use for **Ball Drop**, and the maximum size for the perimeter and area to the grade level settings listed in the chart on the next page. After selecting a grade level (Figure 4), you may continue to adjust the settings for your students. Additional changes in individual Teacher Options may cause the Now Selected marker (√) to change positions from the grade level you chose to a No Grade Selected designation (Figure 5). The change in position simply indicates that you have altered the preset values from those displayed in the chart.

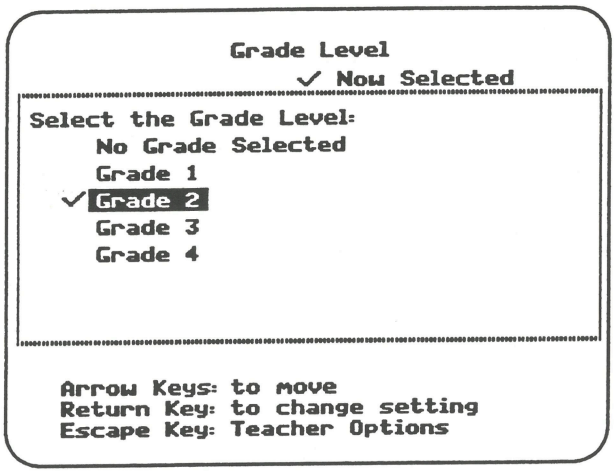


Figure 4

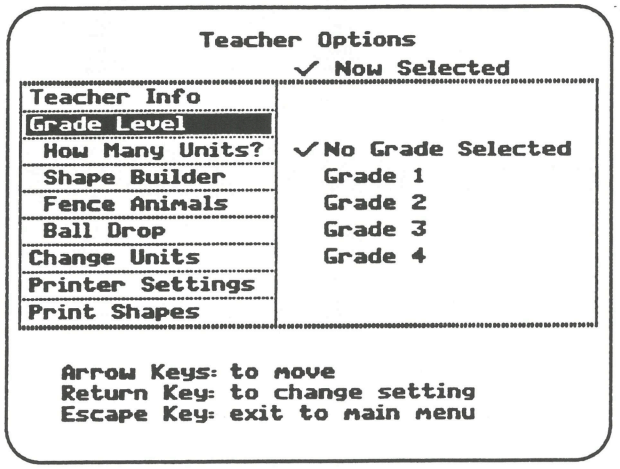


Figure 5

Grade Level Settings

Selecting a grade level setting automatically alters the types of rulers; linear, weight, and liquid units to present; turn on/off the use of fractions (quarter- and half-inches and half-foot); and the Range of Perimeters and Areas Size options to the values displayed on the next page. These values are based on the content sequences for measurement skills suggested by several textbooks and school curriculum guides. These suggestions should be viewed as a general guide because the specific instructional needs for individual students vary greatly.

*Note: The **Putting Around** program is for all grade levels and does not require Teacher Options.*

TEACHER OPTIONS (continued)

Program	Grade 1	Grade 2	Grade 3	Grade 4
How Many Units?	√ Inch Fractions √ Foot √ cm mm dm	√ Inch Fractions √ Foot √ cm √ mm dm	√ Inch √ Fractions √ Foot √ cm √ mm √ dm	√ Inch √ Fractions √ Foot √ cm √ mm √ dm
Alignment Non-Standard Units	on on	on on	off off	off off
Shape Builder	√ 2-10	√ 2-10	√ 2-16	√ 2-16
Fence the Animals	√ 10-20	√ 10-20	√ 10-30	√ 10-30
Ball Drop	√ Off Easy Hard	Off √ Easy Hard	Off Easy √ Hard	Off Easy √ Hard

Option 3: How Many Units?

This option allows you to select the units of measurement, turn the ruler alignment on or off, and turn non-standard units* on or off (Figure 6). Turning on non-standard units presents rulers made of objects laid end-to-end. The objects range from boxes to pencils (Figure 7). The inch and centimeter units, common to the curriculum for Grades 1-4, cannot be turned off.

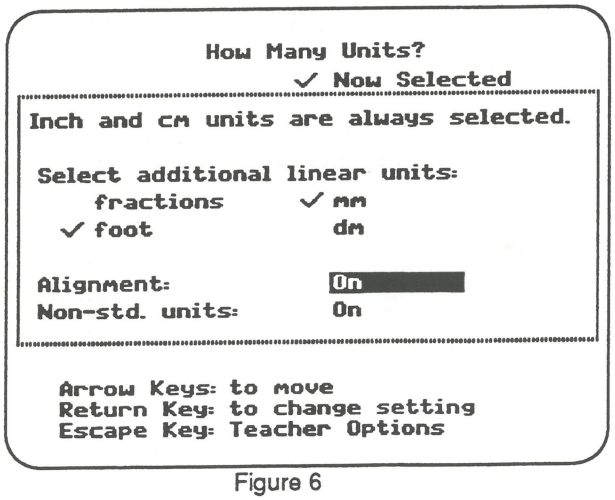


Figure 6

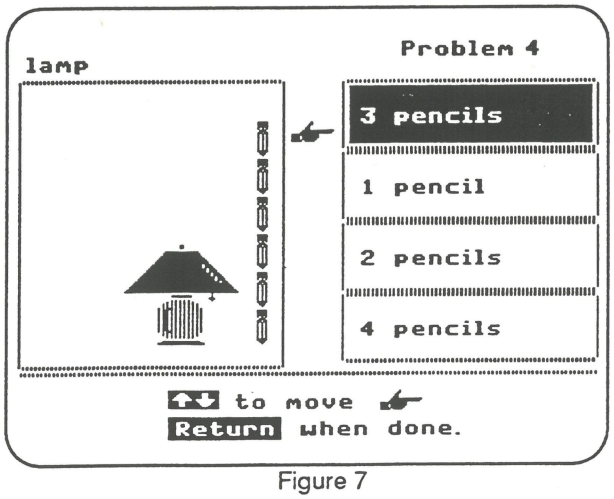


Figure 7

* In this manual and program, non-standard units refers to objects of the same dimensions forming a ruler (examples include pencils, boxes, and triangles). The measurement will be stated in terms of the number of objects that are necessary to judge the height or width of the object.

TEACHER OPTIONS (continued)

Option 4: Shape Builder

This option allows you to set the largest area possible (Figure 8). Upon entering the program, your students can select from a range of shape areas from 2 at the smallest up to the area you have set.

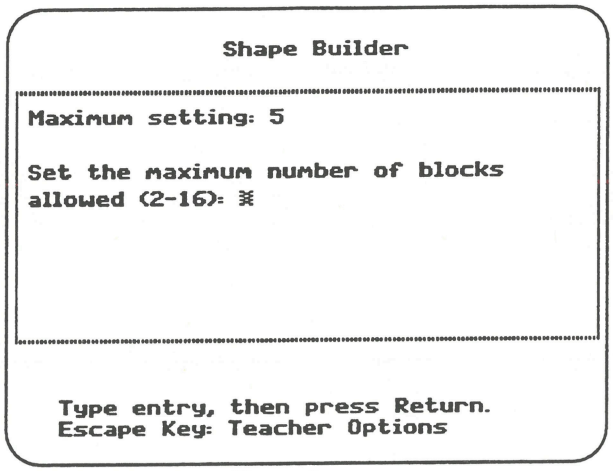


Figure 8

Option 5: Fence the Animals

This option allows you to set the largest perimeter of fences your students will be allowed to use. The program uses perimeters from 4 at the smallest up to the largest perimeter you have set. The allowable range is from 10 units to 30 units in even numbers only.

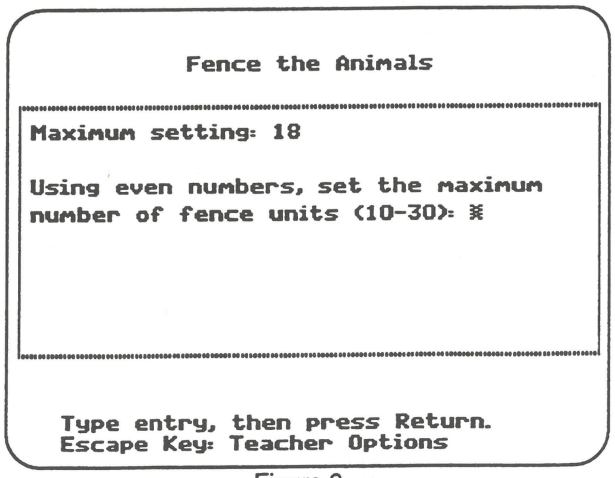

Fence the Animals
Maximum setting: 18
Using even numbers, set the maximum
number of fence units (10-30): ⌘
Type entry, then press Return.
Escape Key: Teacher Options

Figure 9

TEACHER OPTIONS (continued)

Option 6: Ball Drop

The **Ball Drop** Teacher Option allows you to set a level of play that fits the reading and comprehension level of your students (Figure 10). In the Easy level, all of the object names are in the top two rows on the screen and the units of measurement are in the last two (Figure 11). This makes the recognition and the interactive skills of the game easier, allowing younger students more opportunity to concentrate on the measurement skills of the game. The Hard level mixes the object names and the units of measurement across the complete playing screen. The program can also be turned off for students who have not reached this reading level.

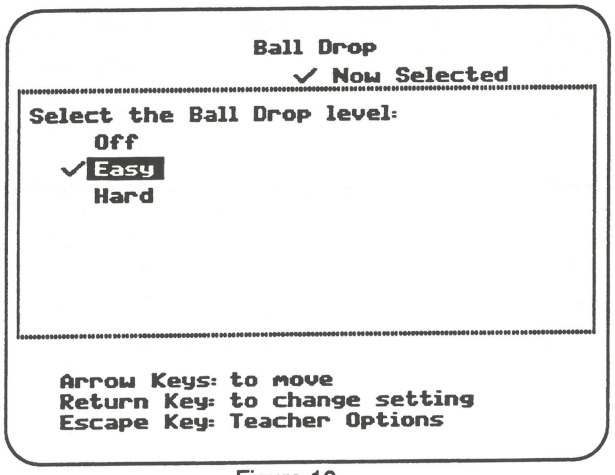


Figure 10

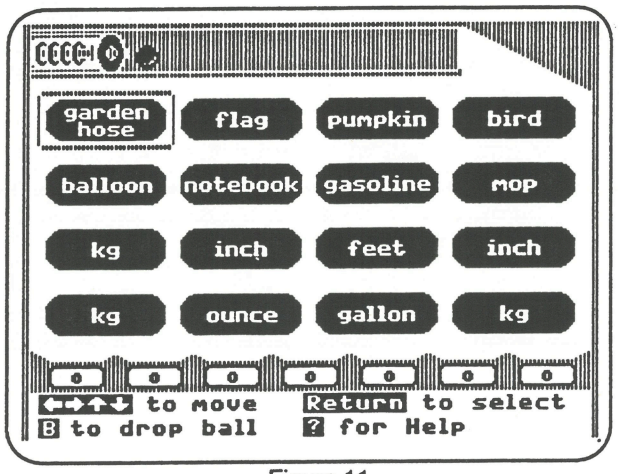


Figure 11

Option 7: Change Units

You can use this option to specify the measurement system you want the programs to present to your students (Figure 12). You can select English only or metric only or use both systems of units. Remember, the inch and centimeter units, depending on which system you have selected, cannot be turned off.

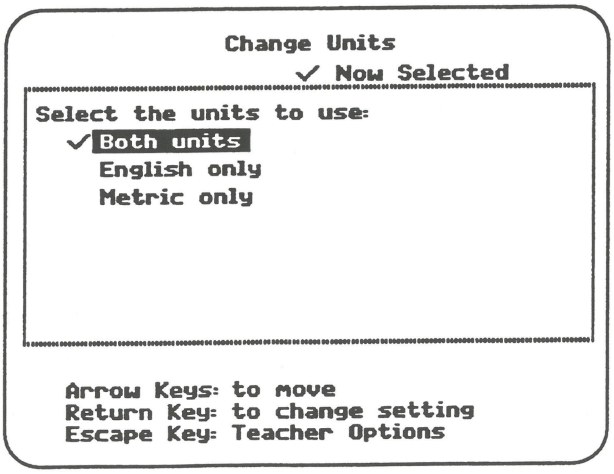


Figure 12

TEACHER OPTIONS (continued)

Option 8: Printer Settings

This option is used to designate and test the type of printer, printer interface card, and slot number that you are using with this program (Figures 13 and 14). (**Shape Builder** is the only program that uses a printer.)

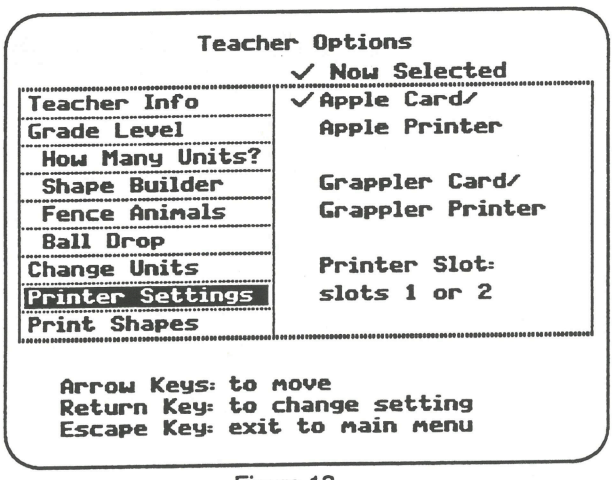


Figure 13

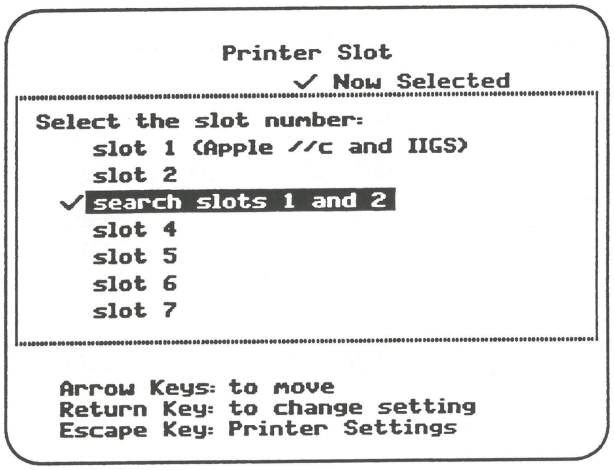


Figure 14

Option 9: Print Shapes

This option allows you to turn the printer on or off for the program **Shape Builder**, according to the needs of your students and the hardware in your lab (Figure 15).

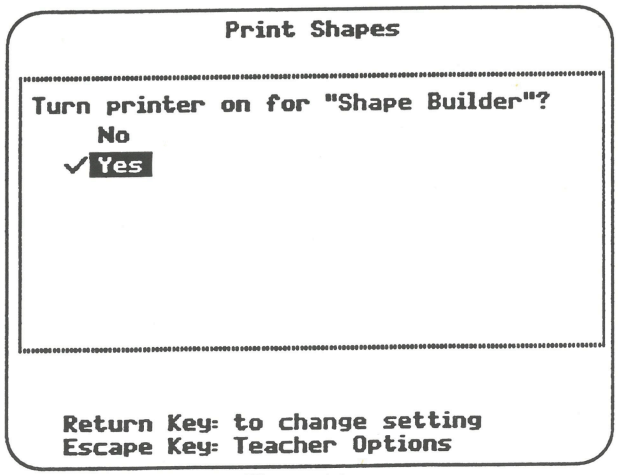


Figure 15

DESCRIPTION

In this program, students practice recognizing different units on a ruler, lining objects up to the ruler edge, reading rulers, and estimating the height or width of an object in non-standard units*. Ten multiple-choice questions are presented, each requiring students to determine and select the best measurement for the object displayed. The linear units, use of non-standard units, fractions, and turning on or off the Ruler Alignment option can be controlled through the Teacher Options.

Curriculum Area:	Mathematics
Subject:	Measurement
Topic:	Linear Measurement
Type:	Drill and Practice
Grade Range:	1-4
Classroom Type:	Individual

LEARNING OBJECTIVES

After using this program, students will have received practice in:

- aligning a ruler;
- stating the measurement of an object using a number and a unit name; and
- estimating the size of an object to the nearest whole unit.

* In this manual and program, non-standard units refers to objects of the same dimensions forming a ruler (examples include pencils, boxes, and triangles). The measurement will be stated in terms of the number of objects that are necessary to judge the height or width of the object.

PROGRAM PREVIEW

How Many Units? gives students practice at recognizing measurement units on rulers, aligning rulers to the baseline of objects, measuring the size of an object in non-standard units, and reading rulers and specifying a measurement for that object. Ten problems using a multiple-choice format are presented (Figure 16). The units can be adjusted by accessing the Teacher Options. Students answering correctly on the first attempt are rewarded with brief animation. The use of non-standard units to represent whole units on a ruler can be turned on or off. These exercises allow students to recognize the importance of having equal units when making a measurement; the exercises interchange with the ruler measurement problems (Figure 17).

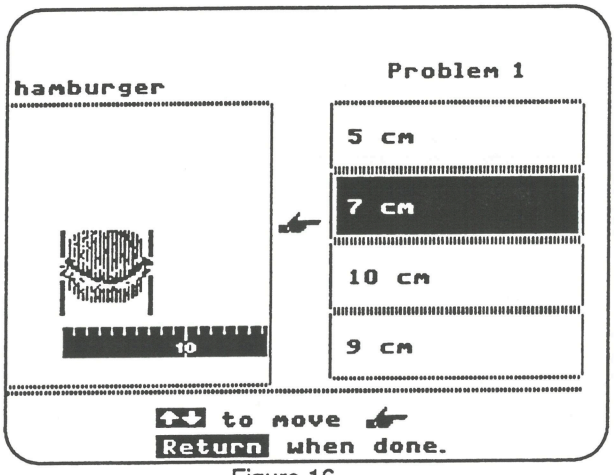


Figure 16

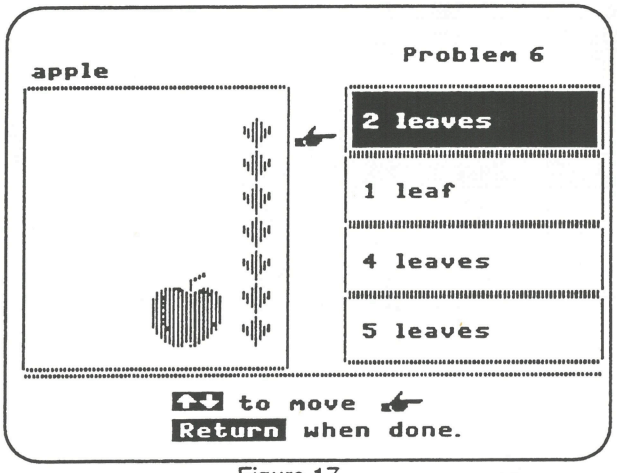


Figure 17

If the alignment in the Teacher Options is turned on, students need to use the arrow keys to move and align the rulers to the baseline of the object before they can select an answer (Figure 18). When a problem is missed, students continue until the correct answer is either given or is the only remaining choice (Figure 19). When a lesson is finished, students see a summary screen that indicates the number of problems they answered correctly on their first attempt.

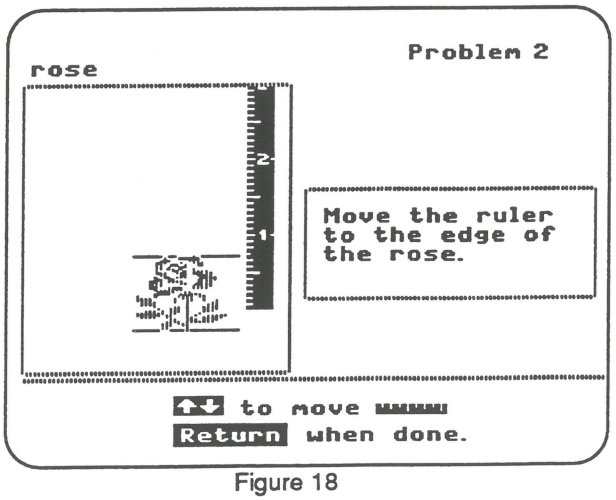


Figure 18

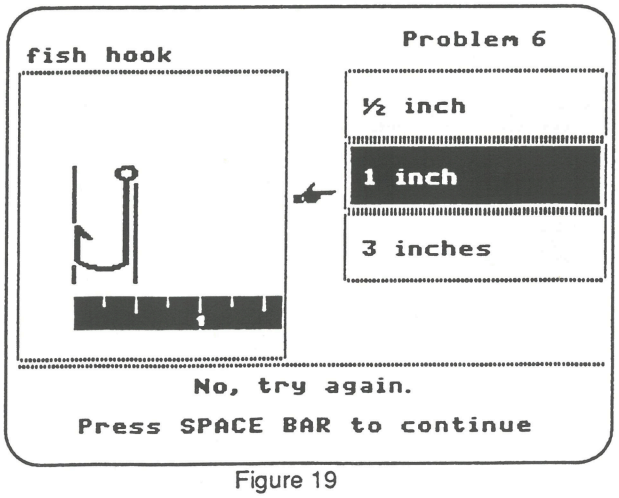


Figure 19

USE IN AN INSTRUCTIONAL SETTING

Preparation

Before using this program, you should access the Teacher Options and adjust the settings to meet the instructional needs of your students. With these settings, you can adjust the program to present content appropriate for Grades 1-4. Suggested settings for each grade level are listed on page 3.

Classroom tests have shown that some beginning readers may require assistance the first time they run this program. Review with them the keys that are used to move and select. The arrow keys move the cursor (pointing hand) to select an answer. The Return Key is then used to select an answer.

Briefly demonstrate the program and review the rulers and the units they represent. For another preparation activity, you may want to practice aligning rulers to various objects in your classroom. After these short instructional sessions, most students can use this program easily.

The activities presented provide some problem-solving practice. Not all of the objects match perfectly to the unit markings on the rulers. Students will need to decide what the possible answers are. They look at the choices and select the best answer possible. An example of this type of problem is use of non-standard units. For example, if the object is between two and three pencils tall but closer to two pencils, the correct answer would be 2.

Using the Program

When the Ruler Alignment option is turned on, the first step in each exercise is to use the arrow keys and align the edge of the ruler to the edge of the object. Once the ruler is aligned, press the Return Key to check the alignment and, when correct, the answer choices appear on the right side of the screen. (During classroom tests, we noticed that some students aligned the ruler but didn't press the Return Key to check the alignment. They made the exercise more difficult by then trying to find the correct answer without having the choices displayed. The answer choices give the units used on the ruler.) Continue with the exercise by using the Up and Down Arrow Keys to move the cursor to select the best answer choice and by pressing the Return Key.

The program produces sound when the students correctly answer a problem on their first attempt. The sound feature may be turned off by pressing Control-S when the computer is waiting for a response (press S while holding down the Control Key).

DESCRIPTION

In this program, students practice creating various shapes with the same area. Students can specify an area amount and challenge themselves to draw many different shapes with that same area. The range of the areas students can select from are controlled through the Teacher Options.

Curriculum Area:	Mathematics
Subject:	Measurement
Topic:	Area
Type:	Problem-Solving Practice
Grade Range:	1-4
Classroom Type:	Individual

LEARNING OBJECTIVES

After using this program, students will have received practice in:

- recognizing that different shapes can have the same area;
- understanding the concept of area measurement; and
- preparing a strategy or working style to complete the exercise.

PROGRAM PREVIEW

Shape Builder gives students practice at creating different shapes with the same area (Figure 20). The program checks that the shapes have not been drawn before and students can work to fill the screen with different shapes they have created. A full screen consists of 21 shapes. Areas of 2 and 3 will not create that many shapes. The exercise continues until 21 shapes have been completed, or the students may press the Q Key to end and /or pick another area measurement to work with. Shapes are checked to see that they are a single shape (all boxes connect or touch) and that they have not been created before (Figures 21 and 22).

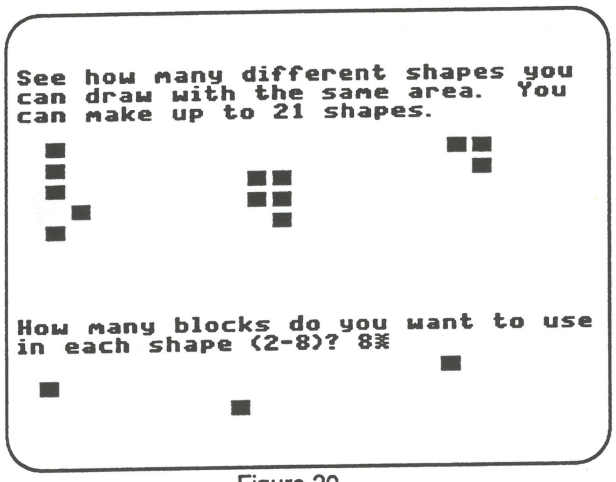

See how many different shapes you
can draw with the same area. You
can make up to 21 shapes.
How many blocks do you want to use
in each shape (2-8)? 8

Figure 20

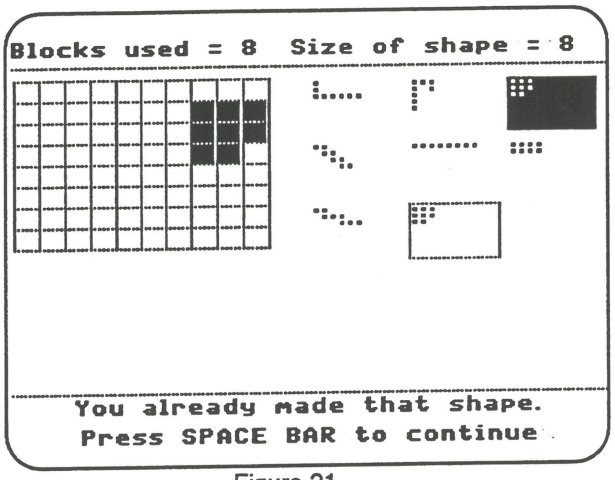


Figure 21

At any point while drawing a shape, students may press the S Key to erase the highlighted boxes and begin the shape again. After any number of shapes have been created, pressing the P Key will print out a record of the shapes created (Figure 23).

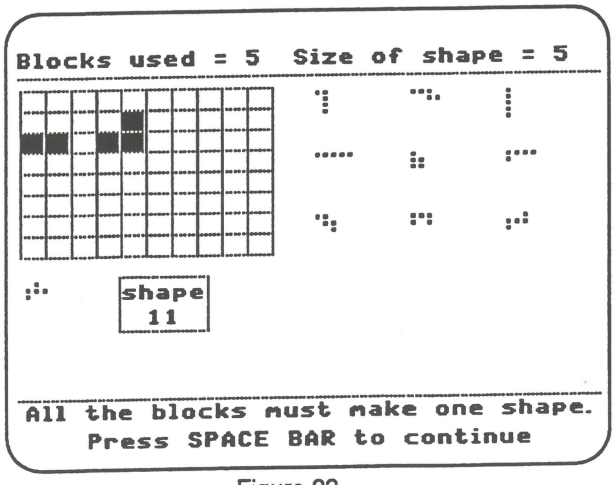


Figure 22

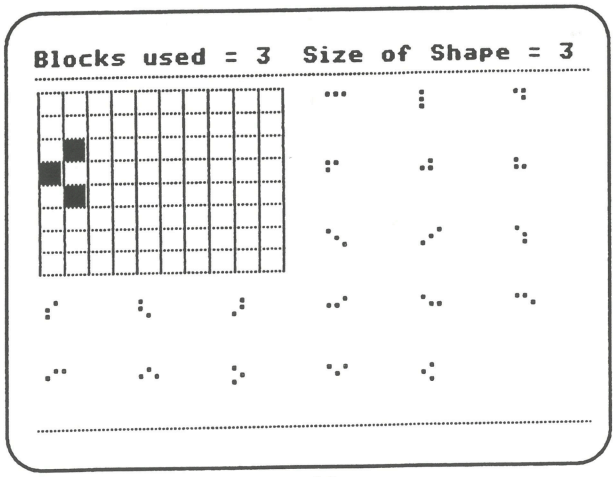


Figure 23

USE IN AN INSTRUCTIONAL SETTING

Preparation

Before using this program, you should access the Teacher Options and adjust the settings to meet the instructional needs of your students. With these settings, you can adjust the program to present content appropriate for Grades 1-4. Suggested settings for each grade level are listed on page 3.

Beginning users may require assistance the first time they run this program. Review with them the keys that are used to move and to select. Use the arrow keys to move in the appropriate directions. Remember, backing up erases the unit square that was already highlighted. The Return Key is then used to signify a final shape. Pressing the S Key erases a partial or complete shape and allows the students to start the shape again. After any number of shapes have been completed, the P Key can be used to print out a copy of the screen as a record of the shapes created.

Briefly demonstrate the program and review the visual representations of the working area and the completed shapes stored on the right side of the screen. After a short instructional session, most students can use this program easily.

Using the Program

When the students first see the program and the range of the areas they have to work with, their tendency is to want to work with the largest area possible. After they have an understanding of the program, let them test the range of the exercises by using the largest numbers. It is easiest to learn the exercise by using larger areas (for example, 7 and 8) and then challenge the students by asking them to fill the screen with shapes of an area of 3 or 4. They will soon find that this is more of a challenge than the larger areas because a limited number of shapes can be created. It would not be the best to begin the exercise with areas of 2, 3, or 4 because a limited number of shapes can be created and students may become frustrated before they completely understand the exercise. You can create four shapes with an area of 2 and 20 shapes with an area of 3. Creating all of the possible shapes with an area of 3 can be a method to challenge your students. When students are familiar with the program, they could chart their results and findings as they create shapes with different areas. They could look for patterns in how the shapes are created or in the number of shapes that can be created with the different areas.

DESCRIPTION

In this program, students practice drawing shapes using a perimeter specified for the exercise. The range of the perimeter settings to use can be controlled through the Teacher Options.

Curriculum Area:	Mathematics
Subject:	Measurement
Topic:	Perimeter Measurement
Type:	Problem-Solving Practice
Grade Range:	1-4
Classroom Type:	Individual

LEARNING OBJECTIVES

After using this program, students will have received practice in:

- recognizing that shapes with the same perimeter can look different;
- understanding the concept of perimeter; and
- preparing a strategy or working style to complete the exercise.

PROGRAM PREVIEW

In this program, students are introduced to perimeter by drawing various shapes with the same or different perimeters (Figure 24). The shapes drawn by the students must be closed, simple ones. Students should try to enclose as many of the animals as they can (Figure 25). The shapes are built with fence segments. The exercise consists of ten different exercises in perimeter measurement. The range of perimeters can be adjusted by accessing the Teacher Options.

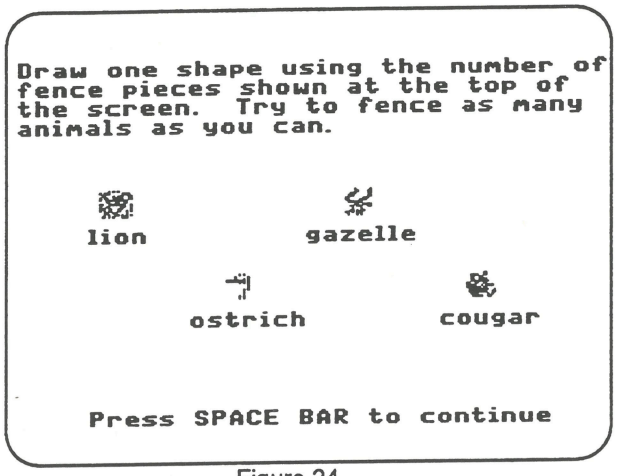

Draw one shape using the number of fence pieces shown at the top of the screen. Try to fence as many animals as you can.
lion
gazelle
ostrich
cougar
Press SPACE BAR to continue

Figure 24

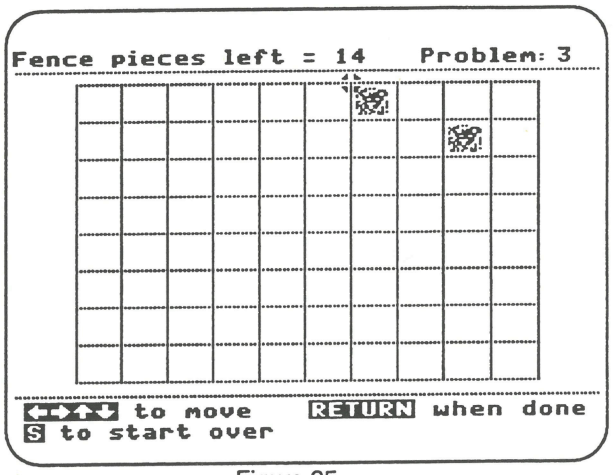


Figure 25

If the shape is not closed, students will not create a fence and the animals will be loose (Figure 26). Students may decide to start their shape again. Pressing the S Key erases the shape they were drawing and allows them to start again. Also, backing up over a fence segment already drawn will erase it. A number count of fence segments is kept at the top of the screen. The count decreases as the students build their fence. Incorrect attempts at a problem causes that problem to be repeated within the remaining set of ten problems. If students get that same problem wrong on the second attempt, a method of solving the problem will be shown (Figure 27).

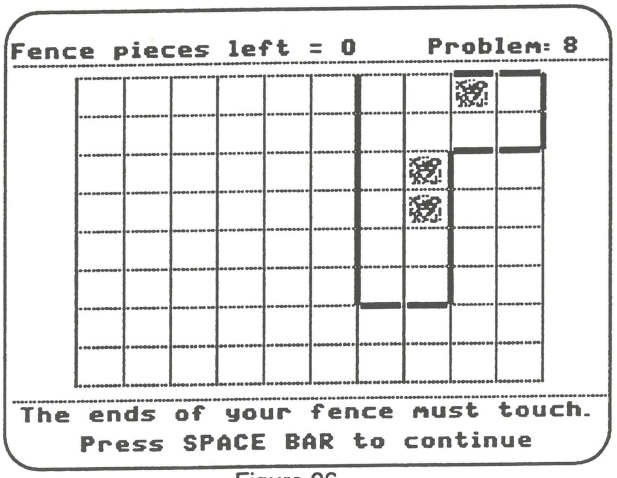


Figure 26

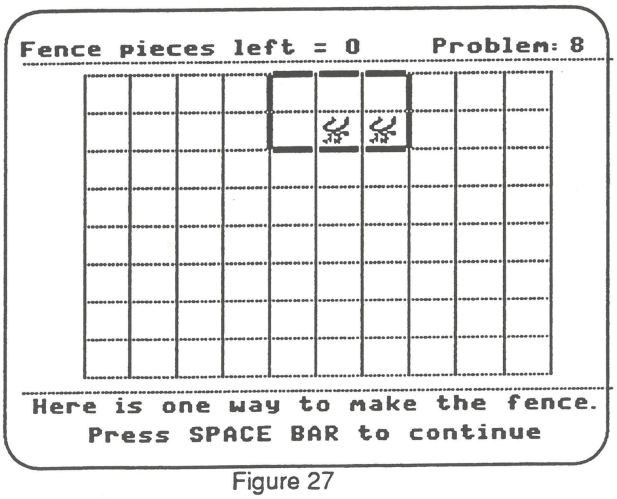


Figure 27

USE IN AN INSTRUCTIONAL SETTING

Preparation

Before using this program, you should access the Teacher Options and adjust the settings to meet the instructional needs of your students. With these settings, you can adjust the program to present content appropriate for Grades 1-4. Suggested settings for each grade level are listed on page 3.

Beginning users may require assistance the first time they run this program. Review with them the keys that are used to move and to select. Use the arrow keys to move in the appropriate directions. Remember, backing up over a fence segment erases that segment. The Return Key is used to signify a completed shape. Pressing the S Key erases a partial or complete shape and allows the students to start the shape again, and pressing the Q Key allows them to quit the exercise or the **Fence the Animals** program.

Briefly demonstrate the program and review the visual representations of the shapes and the number of segments.

Using the Program

With the erase function, student can challenge themselves to build fences that contain the largest possible number of animals. The erase function is only available before the count of fence pieces left is zero. At that point, pressing the S Key allows students to start over.

If students create a fence with any shape that has the correct perimeter, they will receive credit, but they will receive different feedback than when they also fence in the animals. The feedback supports the correct shape that was drawn but recognizes that the goal of fencing in animals (challenging the students to create varied shapes according to the different positions of the animals) was not met. Students notice the difference in the feedback and would rather receive the "Good Job!" message. The animals add a challenge, which can help students reach the instructional goal while learning about perimeter.

DESCRIPTION

In this program, students earn points by successfully matching an object name with an appropriate unit to be used when measuring its linear size, liquid capacity, or weight. The level of difficulty can be controlled through the Teacher Options.

Curriculum Area:	Mathematics
Subject:	Measurement
Topic:	Units of Measurement
Type:	Drill and Practice
Grade Range:	2-4
Classroom Type:	Individual

LEARNING OBJECTIVES

After using this program, students will have received practice in:

- recognizing appropriate units of measurement;
- judging the best unit of measurement; and
- following a strategy or working style to complete the exercise.

PROGRAM PREVIEW

Ball Drop gives students practice at matching an object name with an appropriate unit to be used when measuring its linear size, liquid capacity, or weight. The matching screen contains 16 boxes—eight with object names and eight with units of measurement (Figure 28). Students use the arrow keys to move around the screen and the Return Key to select an object name and a matching unit of measurement (Figure 29).

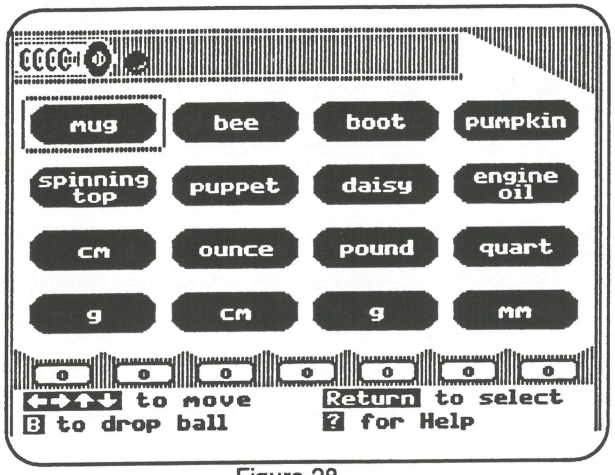


Figure 28

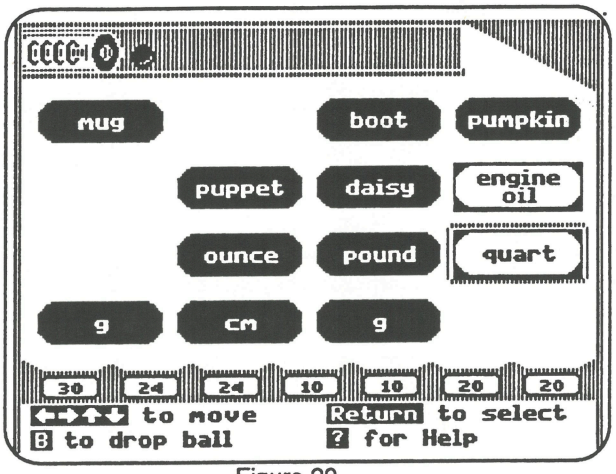


Figure 29

Correct matches are awarded points (shown in the slots at the bottom of the screen); the points decrease when incorrect matches are made. The number of bonus poles (marked with stars) that appear on the screen increase when correct matches are made. Students can score the most points by making as many correct matches as possible before advancing to the screen. Pressing the B Key advances them to the screen, where they can score points. If they clear the screen of all possible matches on the first attempt, they receive a bonus ball and can score even more points (Figure 30). The action of the ball can be controlled by the point where the space bar is hit. If the spring is coiled against the left edge of the screen, the ball is hit harder and travels farther across the screen (Figure 31). Points continue to add up through all five sessions.

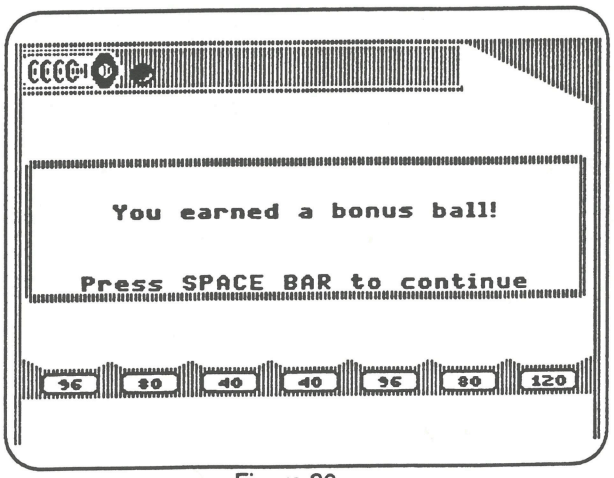


Figure 30

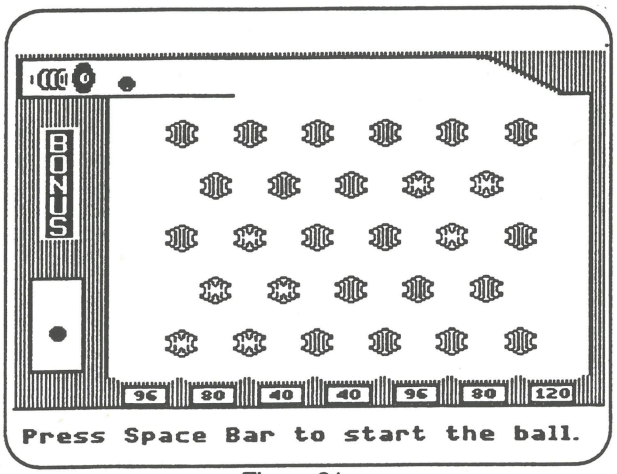


Figure 31

USE IN AN INSTRUCTIONAL SETTING

Preparation

Before using this program, you should access the Teacher Options and adjust the settings to meet the instructional needs of your students. With these settings, you can adjust the program to present content appropriate for Grades 1-4. Suggested settings for each grade level are listed on page 3.

Classroom tests have shown that some beginning users may require assistance the first time they run this program. Review with them the keys that are used to move and select. Either set of arrow keys can be used to move the cursor around the screen. The Return Key is then used to select an answer. Selected answers are shown inversed on the screen.

Use the worksheet on page 27 to introduce the concept of selecting the best units of measurement in **Ball Drop**. Work as a class to complete a number of matches and let the students finish the worksheet when they understand how to complete the matches.

Next, briefly demonstrate the program and explain some of the Extra Point options. Use the included worksheet as a reference to the metric abbreviations if your class needs a reminder of the units they represent. When working with the program, press the Question Mark Key to go to the Help screen, which shows the abbreviations. Students can plan a strategy or order of priority when matching to earn more points. One almost-sure method of clearing the screen is by matching liquid units first because there are fewer liquid units on the screen. Most students will pick up on this as a strategy, but it may be necessary to direct some questions leading to this strategy for students who are having a difficult time clearing the screen of matches.

It may also be necessary to remind your students of the difference between an ounce and a fluid ounce since both can appear on the matching screen.

Using the Program

Most of the objects have several possible answers, including the best unit to use to measure its height or width, to find its weight, or to measure its liquid capacity. If both metric and English units are turned on, the answer possibilities double.

The program produces sound when the students try to answer a problem. The sound feature may be turned off by pressing Control-S when the computer is waiting for a response (press S while holding down the Control Key).

DESCRIPTION

In this program, students have fun playing golf while applying linear units of measurement when putting on the green. They select a putting force as they try to hit the ball into the hole. The force used and the distance traveled by the ball are proportional. This program can be used to conclude a chapter on measurement or as a supplemental activity at the end of a lab session.

Curriculum Area:	Mathematics
Subject:	Measurement
Topic:	Linear Measurement
Type:	Problem-Solving Practice
Grade Range:	1-4
Classroom Type:	Individual

LEARNING OBJECTIVES

After using this program, students will have received practice in:

- estimating distance;
- establishing a relationship between force and distance; and
- preparing a strategy or working style to complete the exercise.

PROGRAM PREVIEW

Putting Around gives students practice at recognizing and applying larger units of linear measurement: yards and meters. Students select a golf club to use to drive the ball down the course toward the target hole (Figure 32). Once they land on the green, they select a putting force to determine the distance the ball travels across the green (Figure 33).

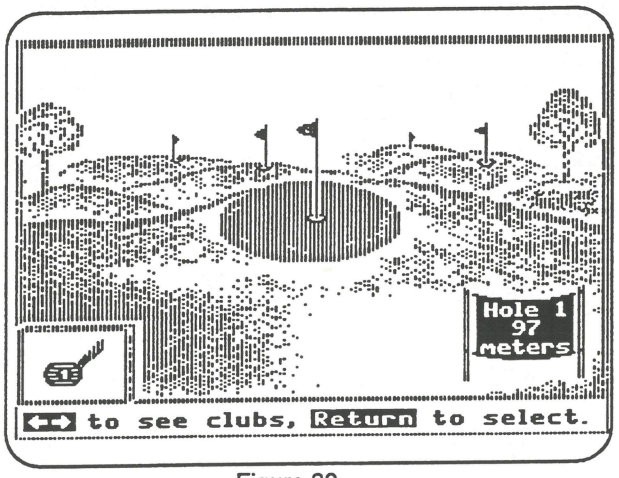


Figure 32

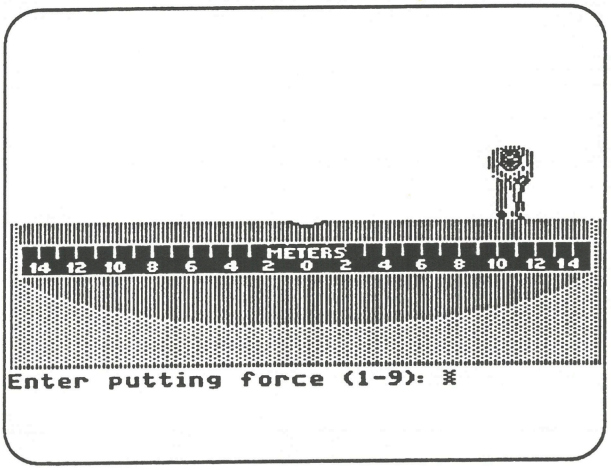


Figure 33

Selecting a force too strong for the necessary distance could cause the ball to overshoot the hole and the students will have to putt again from the other side of the hole (Figure 34). The force selections correspond proportionally to the distance the ball will travel. This allows students to apply the ruler measurements at the base of the screen when selecting a force (Figure 35).

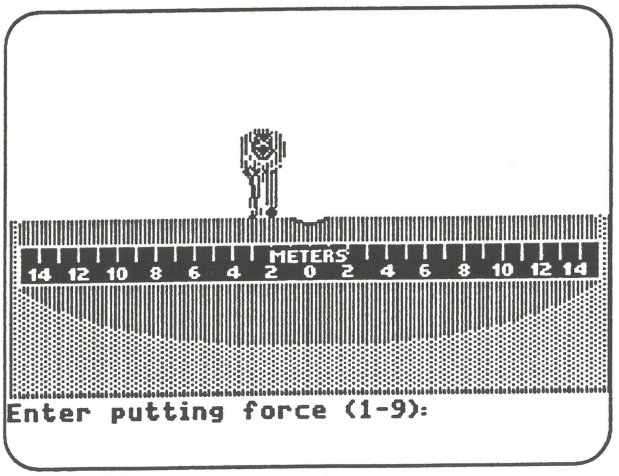


Figure 34

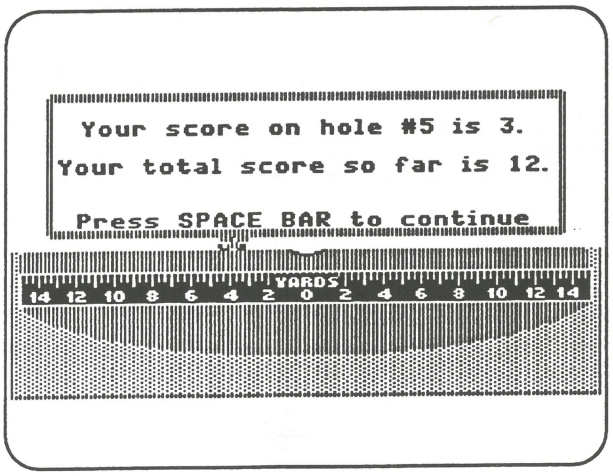


Figure 35

USE IN AN INSTRUCTIONAL SETTING

Preparation

Beginning users may require assistance the first time they run this program. Review with them the keys that are used to move and select. The arrow keys move the cursor to select a club. The Return Key is then used to select an answer.

Briefly demonstrate the program and review the visual representations of the rulers and the distances of the holes on the course.

Using the Program

The program produces sound. The sound feature may be turned off by using that option on the main menu or by pressing Control-S when the computer is waiting for a response (press S while holding down the Control Key).

TEXTBOOK CORRELATION

Measure Works is designed to be directly integrated into your normal elementary mathematics lessons. The following charts correlate the instructional objectives from three popular elementary textbook series (Scott, Foresman; Harcourt Brace Jovanovich; and Addison-Wesley) to specific programs in ***Measure Works***. By referring to these charts and adjusting the content of the programs through the Teacher Options, you can create lessons that directly relate to your classroom activities.

Scott, Foresman; Invitation to Mathematics; 1987

Grade	Page	Content	*Measure Works* Program
1	99-100	Use non-standard units of measurement to determine length or height.	How Many Units?
	101-102	Use the inch as a unit of measurement.	How Many Units?
	103-104	Use an inch ruler.	How Many Units?
	107-108	Use the centimeter as a unit of measurement.	How Many Units?
	109-110	Use a centimeter ruler.	How Many Units?
2	57-60	Use non-standard units of measurement to determine length and height.	How Many Units?
	61-64	Use the inch as a unit of measurement and use the inch ruler.	How Many Units?
	67-70	Use the centimeter as a unit of measurement and use the centimeter ruler.	How Many Units?
	71-72	Decide if a container holds more than a liter or less than a liter.	Ball Drop
	75-76	Count the number of square units to determine the area.	Shape Builder
3	208-209	Measure objects to the nearest centimeter.	How Many Units?
	210-211	Choose an appropriate unit of measurement of length using centimeter, meter, or kilometer.	Ball Drop
	212-213	Choose an appropriate unit of weight (mass) using gram or kilogram.	Ball Drop
	214-215	Choose an appropriate unit of capacity using milliliter or liter.	Ball Drop
	218-219	Measure objects to the nearest inch.	How Many Units?
	220-221	Choose an appropriate unit of length using inch, foot, yard, or mile.	Ball Drop
	222-223	Choose an appropriate unit of weight using ounce or pound.	Ball Drop
	224-225	Choose an appropriate unit of capacity using cup, pint, quart, or gallon.	Ball Drop
4	94-95	Measure objects to the nearest centimeter and choose an appropriate unit of measurement of length using centimeter or decimeter.	How Many Units?
	96-97	Choose an appropriate unit of measurement of length using centimeter, decimeter, meter, or kilometer.	Ball Drop
	98-99	Choose an appropriate unit of measurement of weight (mass) using gram or kilogram.	Ball Drop

TEXTBOOK CORRELATION (continued)

Scott, Foresman; Invitation to Mathematics; 1987 (continued)

Grade	Page	Content	*Measure Works* Program
4	100-101	Choose an appropriate unit of measurement of capacity using milliliter or liter.	Ball Drop
	106-107	Measure objects to the nearest inch and choose the appropriate unit of measurement of length using inch or foot.	How Many Units? and Ball Drop
	108-109	Choose an appropriate unit of measurement of length using inch, foot, yard, or mile.	Ball Drop
	110-111	Choose an appropriate unit of measurement of weight using ounce, pound, or ton.	Ball Drop
	112-113	Choose an appropriate unit of measurement of capacity using cup, pint, quart, or gallon.	Ball Drop

Harcourt Brace Jovanovich; Mathematics Today; 1987

Grade	Page	Content	*Measure Works* Program
1	333-334	Find the length of objects using non-standard units.	How Many Units?
	335-336	Measure length to the nearest centimeter.	How Many Units?
	339-340	Measure length to the nearest inch.	How Many Units?
2	297-298	Measure length in centimeters.	How Many Units?
	299-300	Identify the number of units around a figure.	Fence the Animals
	301-302	Identify the number of square units in a figure.	Shape Builder
	311-312	Identify the length of an object to the nearest inch.	How Many Units?
3	234-235	Measure length to the nearest centimeter.	How Many Units?
	236-237	Identify the relationship among centimeters, meters, and kilometers.	Ball Drop
	238-239	Find the perimeter of an object in centimeters.	Fence the Animals
	240-241	Identify area in square units.	Shape Builder
	246-247	Identify the relationship between milliliter and liter.	Ball Drop
	248-249	Identify the relationship between gram and kilogram.	Ball Drop
	254-255	Measure the length of an object to the nearest inch and half-inch.	How Many Units?
	256-257	Identify the relationship among foot, yard, and mile.	Ball Drop
	262-263	Identify the relationship among cup, pint, quart, and gallon.	Ball Drop
	264-265	Identify the relationship between ounce and pound.	Ball Drop
4	216-217	Identify a length to the nearest centimeter.	How Many Units?
	222-223	Find the area of a surface by counting square units.	Shape Builder
	246-247	Identify a length to the nearest inch, half-inch, and quarter-inch.	How Many Units?
	250-251	Find the perimeter and area of a rectangle in customary units.	Fence the Animals

TEXTBOOK CORRELATION (continued)

Addison-Wesley; Mathematics; 1987

Grade	Page	Content	*Measure Works* Program
1	267-268	Find length using non-standard units.	How Many Units?
	269-270	Find length to the nearest centimeter.	How Many Units?
	271-272	Identify the correct way to use a ruler.	How Many Units?
	273-274	Practice measuring objects to the nearest centimeter.	How Many Units?
	277	Estimate capacity using liters.	Ball Drop
	279	Estimate weight using kilograms.	Ball Drop
2	225-226	Find length using non-standard units.	How Many Units?
	227-228	Find length in centimeters.	How Many Units?
	229-230	Find length to the nearest centimeter.	How Many Units?
	231-232	Estimate length to the nearest centimeter.	How Many Units?
	233-234	Find lengths of paths. Find the perimeter of a figure.	Fence the Animals
	237-238	Find the area of a figure by counting square centimeters.	Shape Builder
3	130	Use an arbitrary unit to measure length.	How Many Units?
	131	Use the centimeter unit to measure the length of objects having an exact number of centimeter units.	How Many Units?
	132-133	Measure length to the nearest centimeter.	How Many Units?
	134	Choose appropriate units of length: centimeters or meters.	Ball Drop and Putting Around
	138-139	Find area by counting square units.	Shape Builder
	346-347	Estimate length using inches, feet, and yards.	Ball Drop and Putting Around
	348-349	Measure length to the quarter-inch.	How Many Units?
4	138-139	Measure length to the nearest centimeter.	How Many Units?
	140-141	Choose appropriate units of length: centimeters or meters.	Ball Drop
	368-369	Estimate length using inches, feet, and yards.	How Many Units? Putting Around
	370-371	Measure length to the nearest quarter-inch.	How Many Units?

Appendices

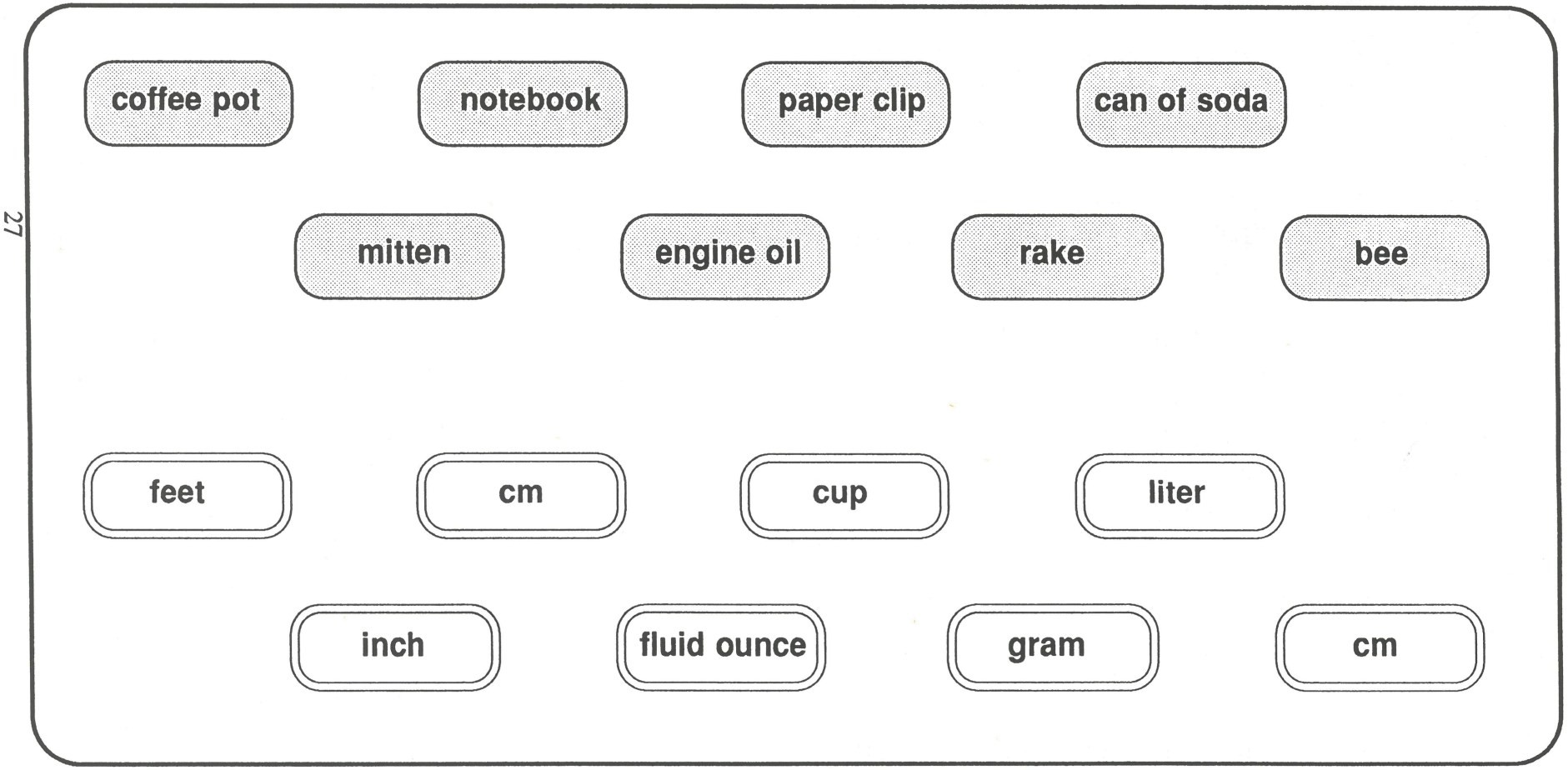
Ball Drop Worksheet

Name _____

For the exercise below, match an object name with the best unit you would use to:

- find its linear size,
- find its weight, or
- find how much liquid it holds.

Draw a line connecting two oblong shapes that make a match. Object names are in the shaded oblong shapes. Units of measurement are in the double-line oblong shapes.



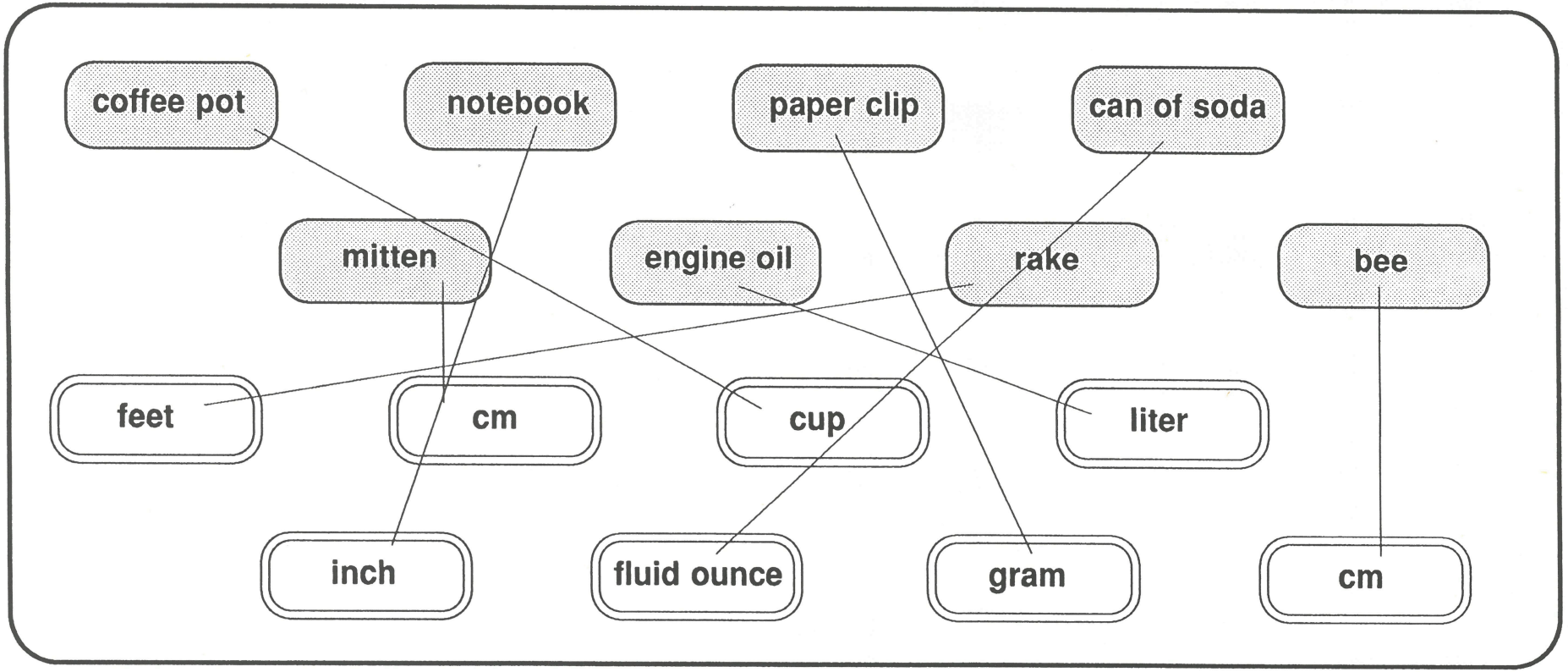
Ball Drop Worksheet — *Answer Key*

Name_____

For the exercise below, match an object name with the best unit you would use to:

- find its linear size,
- find its weight, or
- find how much liquid it holds.

Draw a line connecting two oblong shapes that make a match. Object names are in the shaded oblong shapes. Units of measurement are in the double-line oblong shapes.



Other possible matches:

paper clip — centimeter bee — gram mitten — gram paper clip — inch mitten — inch bee — inch notebook — centimeter

METRIC ABBREVIATIONS

For length, width, or height

mm = millimeter
cm = centimeter
dm = decimeter
m = meter

For liquid capacity

ml = milliliter
l = liter

For weight

g = gram
kg = kilogram

CREDITS

Measure Works was produced by a MECC development team that included Beth Bell, Vince Erickson, Sue Gabrys, Nan Leekley, Sherry Luedloff, and Diane Portner. The developers of ***Measure Works*** greatly benefited from and appreciated the efforts of the MECC teams that designed ***Money Works*** and ***Clock Works***, companion products that deal with money counting and recognition skills, and clock- and time-reading skills, respectively.

TO THE READER:

MECC has made every effort to ensure the instructional and technical quality of this courseware package. Your comments—as user or reviewer—are valued and will be included in any future revision of the product. Please address comments to:

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Q. Is it okay for schools to copy software?

A. No, without the publisher's permission, it's not okay for schools to copy software. Software is protected by copyright law, which says that you can't make copies without the permission of the copyright holder. Copyright law is written this way to protect software programmers and publishers and the investment they've made in their products. The creative teams that develop the software — programmers, writers, graphic artists, content specialists, and others — all deserve fair compensation. Without the protection given by our copyright laws, they would be unable to produce the educational, entertainment and productivity software that adds so much to our daily lives.

Q. *What exactly does the law say about copying software?*

A. The law says that it is illegal to make or distribute copies of copyrighted material, including software, without authorization. If you do so, this is piracy, and you may face not only a civil suit, but also fines of up to $100,000 and jail terms of up to 5 years.

Q. *So I'm never allowed to copy software for any reason?*

A. If a backup copy was not included in the box with your original disk(s), you are permitted to make one copy in order to have both a working copy and a backup copy of the program. Copyright law prohibits you from making additional copies of the software for any other reason without the permission of the software company. If the publisher has authorized any exceptions to the copyright law, they will be stated in the license agreements that accompany all software products.

Q. *But aren't schools allowed to make copies for educational purposes?*

A. No. Like individuals and corporations, educational institutions are bound by the copyright law. Because of their unique position of influence, schools have a particular obligation to abide by the copyright law and educate students about their own responsibilities when using software. Just as it would be wrong to buy one textbook and photocopy it for use by many students, it is wrong for a school to duplicate software without the authorization of the publisher. This means that educators cannot make unauthorized copies for their students, either to use in school or to take home.

Q. *At our school, we share programs all the time. We assume this must be okay, since the school purchased the software in the first place.*

A. Many educators are not aware of how the copyright law applies to them. Without the publisher's authorization to make copies, your school needs to purchase as many copies of a program as you will use. However, many software firms do offer special sales arrangements to schools. These include reduced priced lab packs (a number of programs sold together) and site licenses (arrangements which permit schools to copy for a specific location at a fixed price). **Because these arrangements vary from publisher to publisher, it is essential that you read and understand the license agreement for each program before making any copies.**

Q. *We're planning to install a network for our students. How do we know how many copies of software we'll need to purchase?*

A. Remember that the installation of a network does not change your obligations with regard to the copyright law. When purchasing software for a network, be sure to ask the publisher what types of licensing arrangements are available for networks. Some software publishers allow schools to purchase a network license that authorizes the school to install stand-alone software on a network. In addition, many software publishers create special network versions that license the program to be run on the file server of a network. Because some publishers limit the number of workstations that are permitted to legally access the software on the network, it is very important to check the license agreement for any restrictions that may apply.

Q. *I've read the license agreement for one of the software packages purchased by our school. What if I'm not sure that I understand the arrangement correctly?*

A. If you have trouble understanding the license agreement, help is available. Your school district's media or computer specialist may be able to answer your questions. In addition, you can always contact the software publisher and ask for a clarification of the license agreement as it applies to your school. Finally, if you still have questions, contact the Software Publishers Association for more information about software and the copyright law.

Q. *I'll bet most of the people who copy software don't even know they're breaking the law.*

A. Because the software industry is relatively new and because copying software is so easy, many people are either unaware of the laws governing software use or choose to ignore them. It is the responsibility of each and every software user to read and understand the license agreements of the products they use and to be sure that their software use complies with copyright law. See what you can do to initiate a software use policy statement in your school that everyone respects. Finally, as an educator, help set an example for your students that responsible computer users should be "software legal."

If you have any questions about how the copyright law applies to you and your school, please contact the **Software Publishers Association at 202-452-1600.**

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